

Book problems:
p. 519 #2, 10, 17, 23

2) not significant = not rejecting H_0 . So we conclude H_0 is true, and there is no difference between the % of people who get science info from Internet versus TV.

10) (a) Conditions:

1) 2 independent SRS

1) assumed independent SRS

$$2) n_1 \hat{p}_1 \geq 10$$

$$2) 10578.54 \geq 10$$

$$n_1 \hat{q}_1 \geq 10$$

$$1881.46 \geq 10$$

$$n_2 \hat{p}_2 \geq 10$$

$$11169.318 \geq 10$$

$$n_2 \hat{q}_2 \geq 10$$

$$1508.682 \geq 10$$

$$3) \text{pop}_1 \geq 10n_1$$

3) there are more than

$$\text{pop}_2 \geq 10n_2$$

124,600 males and

126,780 females.

Conditions met => Normal model => 2-Prop Z-Interval

(b) $p_M = 10579/12460$

$p_F = 11169/12678$

$$(\hat{p}_M - \hat{p}_F) \pm Z^* \sqrt{\frac{\hat{p}_1 \hat{q}_1}{n_1} + \frac{\hat{p}_2 \hat{q}_2}{n_2}} = (-0.0404, -0.0235)$$

(c) We are 95% confident that the difference between the % of males and females who graduated HS is between -4.04% and -2.35%.

(d) Yes, this does provide strong evidence that girls are more likely to finish HS than boys, because the interval doesn't contain 0, so the %s are different, and the whole interval is negative, so that means that the girls % is larger than boys %.

$$17) \hat{p}_D = \frac{54}{284}$$

$$\hat{p}_L = \frac{11}{41}$$

D = disapprove
L = lenient

(a) Prospective study

$$(b) H_0: p_D = p_L$$

$$H_a: p_D \neq p_L$$

(c) Conditions:

1) 2 independent SRS

1) assumed independent SRS

2) $n_1 \hat{p}_1 \geq 10$

$n_1 \hat{q}_1 \geq 10$

$n_2 \hat{p}_2 \geq 10$

$n_2 \hat{q}_2 \geq 10$

2) $54 \geq 10$

$230 \geq 10$

$11 \geq 10$

$30 \geq 10$

3) $\text{pop}_1 \geq 10n_1$

$\text{pop}_2 \geq 10n_2$

3) there are more than 2840 students whose parents disapprove and more than 410 students whose parents are lenient about it.

Conditions met => Normal model => 2 prop Z-test

$$(d) \quad Z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\frac{\hat{p}\hat{q}}{n_1} + \frac{\hat{p}\hat{q}}{n_2}}} = -1.1694$$

$\hat{p} = \frac{(x_1 + x_2)}{(n_1 + n_2)}$

$$2 * P(Z < -1.1694) = 0.2422$$

$$2 * P(Z > 1.1694)''$$

We fail to reject our H_0 b/c our p-value of 0.2422 is greater than our alpha of 0.05. We have sufficient evidence that the true proportion of smokers with disapproving parents is equal to the true proportion of smokers with lenient parents. Thus, parent attitude doesn't influence teenagers' decisions.

(e) p-value (generic) = prob. of getting our sample (or something more extreme) if the H_0 is true.

In context: Assuming that the % of smokers with disapproving parents is equal to the % of smokers with lenient parents, we have a 24.22% chance of getting our sample (or something more extreme).

(f) If our conclusion is wrong, then we failed to reject when we should have rejected. This is a Type II error. Less serious.

$$23) \hat{p}_1 = \frac{340}{630}$$

$$\hat{p}_1 = 0.54$$

$$\hat{p}_2 = \frac{515}{1010}$$

$$H_0: p_1 = p_2$$

$$H_a: p_1 > p_2$$

Conditions:

1) 2 independent SRS

1) ~~s~~ated random and assumed indep.

$$2) n_1 \hat{p}_1 \geq 10$$

$$2) 340 \geq 10$$

$$n_1 \hat{q}_1 \geq 10$$

$$290 \geq 10$$

$$n_2 \hat{p}_2 \geq 10$$

$$515 \geq 10$$

$$n_2 \hat{q}_2 \geq 10$$

$$495 \geq 10$$

$$3) \text{pop}_1 \geq 10n_1$$

$$\text{pop}_2 \geq 10n_2$$

3) there are more than 6,300 and
10,100 voters

Conditions met \Rightarrow normal model \Rightarrow 2-Prop Z test

$$Z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\frac{\hat{p}\hat{q}}{n_1} + \frac{\hat{p}\hat{q}}{n_2}}} = 1.1743$$

$$P(Z > 1.1743) = 0.1201$$

We fail to reject H_0 because our p-value of 0.1201 is $> \alpha = 0.05$. We have sufficient evidence that the true percent of voters who favor the candidate in the first poll is equal to the percent in the second poll. The results do NOT indicate a decrease in voter support for the candidate.

(b) If our conclusion was wrong, then we failed to reject when we should have rejected. This is a Type II error.